

Amendments to the Specification

The paragraph starting at page 2, line 1 and ending at line 26 has been amended as follows.

When the provision of prints of various kinds and small lots has advanced with the diversification of information in recent years, however, a problem that the plate cost to the individual prints becomes high, and so the price is comparatively expensive has arisen. Further, a further importance has been given to the immediateness of information in recent years, and a demand for an earlier appointed date of delivery in market that “a person wants to immediately obtain a print” is increasing. Even ~~[[in]]~~ with this demand, the reduction of the number of sheets printed does not ~~[[lined]]~~ line up with the earlier appointed date of delivery under the circumstances because the current offset printing requires a long time for the so-called lead time from the preparation of a manuscript to plate making and preparation for printing (stabilization of printing machines), while the printing time that is an actual processing time is not ~~[[so]]~~ as long due to the output rate of about 9,000 sheets per minute. In addition, since vast equipment investment is required, and operations of all steps ~~requires~~ require great skill, the production base is limited, and it takes a long time from completion of the printing ~~[[and]]~~ to delivery of a print to a customer.

The paragraph starting at page 3, line 16 and ending at page 4, line 8 has been amended as follows.

By the way, as a recent trend, it has been required that high-quality images can be recorded by the ink-jet recording system irrespective of the kind of a recording medium. However, the ink-jet recording system is ~~not a little~~ significantly affected by the ink absorbency of a recording medium used, and so it is difficult to record a high-quality image irrespective of the kind of the recording medium. In particular, it is hard to record a high-quality image on recording media (including non-absorbent recording media that do not absorb an ink at all) that are poor in ink-absorbing ability. When recording is conducted on a recording medium poor in ink-absorbing ability, a phenomenon called bleeding ~~[[that]]~~ in which ink droplets ~~[[which]]~~ that are impacted adjacently mix with each other and/or a phenomenon called beading ~~[[that]]~~ in which an ink ~~[[which]]~~ droplet that has impacted previously attracts an ink ~~[[which]]~~ droplet that is impacted ~~subsequently, to cause~~ subsequently causing aggregation of the ink droplets may occur, so that image quality is often deteriorated.

The paragraphs starting at page 4, line 20 and ending at page 6, line 1 have been amended as follows.

In order to satisfy such conflicting requirements, there has been proposed such a system (image forming system using an intermediate transfer medium) that an ink image is formed on an intermediate transfer medium (hereinafter also referred to simply as “transfer

medium” ~~merely~~), and the ink image formed on the transfer medium is transferred to a desired recording medium to form the ink image on the desired recording medium (see, for example, U.S. Patent Nos. 4,538,156 and 5,099,256, and Japanese Patent Application Laid-Open No. 62-92849). In this system, an ink ejected from an ink-jet head is ~~[[once]]~~ caused to impact ~~[[on]]~~ the intermediate transfer medium to lower the flowability of the ink to some extent, and an image formed by the ink, the flowability of which has been lowered, is then transferred from the transfer medium to a ~~recording~~ recording medium.

In order to achieve a high quality ~~of the~~ ink image on the recording medium after the transfer in the image forming system using such an intermediate transfer medium, it is important to obtain a high quality ~~of the~~ ink image on the intermediate transfer medium before the transfer. For that purpose, it is required to ~~make high~~ improve the ability (the degree of retaining the ink ~~[[on]]~~ at the impact position without moving the ink from this position) to hold the ink image on the intermediate transfer medium ~~[[high]]~~. In the above-described reference documents, however, the ability to hold the ink image on the intermediate transfer medium is low, and so beading or bleeding occurs on the intermediate transfer medium like the above-described non-absorbent recording medium. It is accordingly ~~an object~~ desirable to lower the ink flowability on the intermediate transfer medium.

The paragraphs starting at page 6, line 25 and ending at page 8, line 14 have been amended as follows.

However, ~~[[the]]~~ a technique ~~[[that]]~~ by which the flowability of the ink on the intermediate transfer medium can be lowered to ~~make high~~ improve the ink image on the intermediate transfer ~~medium~~ medium, and also the ink image on the recording medium after the ~~transfer~~ transfer, has not been realized by any of the above-described documents.

For example, in the case where the hot-melt ink is used like Japanese Patent Application Laid-Open No. 7-223312, one ~~cannot but~~ must use an ink containing a binder in an extremely great ~~amount~~ proportion to a coloring material for the purpose of developing the phase change property (solid-liquid phase change by heat) of the ink. Therefore, the amount of the ink to be applied ~~comes to increase~~ increases for the purpose of achieving a desired density. As a result, the thickness of the ink of an outputted image becomes great, thus leading to deterioration of image quality. In other words, this system cannot ~~make high~~ improve the quality of the ink image on the recording medium after the ~~transfer~~ transfer, because a sense of incompatibility occurs ~~[[on]]~~ in the ink image on the recording medium after the transfer due to the great thickness of the ink applied. In addition, since the ink solid at ordinary temperature is used, the ink within an ink flow path must be heated and melted upon start-up, and so it takes time to output an image. Further, since there is need ~~of retaining~~ to retain this state during operation, vast energy is required.

Beading ~~[[or]]~~ and/or bleeding cannot be prevented by simply heating the transfer medium like Japanese Patent Application Laid-Open No. 5-330035 because the beading or

bleeding of inks occurs before the ink flowability is sufficiently lowered, since the beading or bleeding occurs in the moment at the impact of the inks. This system only achieves the effect of drying the ink image formed on the transfer medium. The ability to hold the ink image on the transfer medium is still low, and so the quality of the ink image on the transfer medium cannot be ~~made high~~ improved, and the quality of the ink image on the recording medium cannot also be ~~made high~~ improved.

The paragraph starting at page 9, line 10 and ending at line 20 has been amended as follows.

As apparent from the above, to form a high-quality ink image on various recording media including recording media (for example, non-absorbent recording media) that are poor in ink-absorbing ability has not ~~[[been]]~~ yet ~~realized~~ been realized, without being affected by the ink absorbency of the recording ~~[[media]]~~ media, even ~~[[by the]]~~ in methods using the intermediate transfer medium. The same applies to a system in which an ink is directly ejected on a recording medium without using any intermediate transfer medium.

The heading at page 9, line 22 has been amended as follows.

~~DISCLOSURE~~ SUMMARY OF THE INVENTION

The paragraphs starting at page 9, line 23 and ending at page 10, line 5 have been amended as follows.

~~It is therefore an object of the~~ The present invention ~~[[to]]~~ can provide an image forming process, which permits recording of an image on a wide variety of recording media irrespective of the ink absorbency of a recording medium used without sacrificing the high recording flexibility of an ink-jet recording system, and an image forming apparatus used for realizing this process.

~~The above object~~ Such can be achieved by the present invention described below.

The paragraph starting at page 15, line 5 and ending at line 8 has been amended as follows.

~~[[FIGS.]] FIG. 1 and 2 typically illustrate~~ illustrates a conceptual image forming apparatus according to the first ~~and second embodiments~~ embodiment of the present invention. ~~, respectively~~

FIG. 2 illustrates a conceptual image forming apparatus according to the second embodiment of the present invention.

The heading at page 15, line 10 has been amended as follows.

~~BEST MODE FOR CARRYING OUT THE INVENTION~~ DETAILED  
DESCRIPTION OF THE PREFERRED EMBODIMENTS

The paragraphs starting at page 18, line 9 and ending at page 20, line 11 have been amended as follows.

The first embodiment of the present invention will ~~[[then]]~~ now be described in detail. FIG. 1 schematically illustrates an image forming apparatus according to the present invention used in realizing the image forming process according to the first embodiment. In FIG. 1, reference numeral 1 is an intermediate transfer medium having a surface layer 2. The image forming apparatus has a coating device 4 for applying the image-fixing component, a coating device 3 for applying the wettability-improving component and an ink-jet recording apparatus 5 for forming an ink image 6 by ejecting ink droplets from an ink-jet recording head around the intermediate transfer medium. The intermediate transfer medium 1 is rotated in the direction of the arrow in FIG. 1, and the wettability-improving component is first applied to the surface thereof by the coating device 3. Thereafter, the image-fixing component is applied by the coating device 4. After these ~~component~~ components are applied, ink droplets are ejected from the ink-jet recording apparatus 5 to form an ink image 6 on the surface of the intermediate transfer medium 1. A recording surface of a recording medium 9 is then brought into contact with the surface of the intermediate transfer medium 1 by pressing the recording medium 9 against the transfer medium by a press roller 10, whereby an image is formed on the recording medium 9. In the apparatus illustrated in FIG. 1, a device 7 for facilitating the removal of water is arranged to remove water in the ink forming the image on the intermediate transfer medium 1, and the image is then transferred to the recording surface of the recording

medium 9. In the apparatus illustrated in FIG. 1, the surface of the intermediate transfer medium 1 is cleaned by a cleaning device 12, whereby the intermediate transfer medium can be used repeatedly plural times.

~~According to~~ For the image forming process of the first embodiment of the present invention using the image forming apparatus having the above-described construction, the kinds of ~~usable~~ recording media usable are ~~scarcely not very~~ limited, and ~~a different~~ a high quality image can be outputted ~~with high quality~~ on nearly every recording medium. More specifically, since the fixing of an ink in the ordinary ink-jet recording system is achieved by penetration of the ink into paper that is a recording medium, the condition of the image is changed by the quantity of the ink absorbed into the recording medium, or no image can be formed on non-absorbent medium. On the other hand, the offset printing machine is intended to provide a great number of the same prints, and cannot output a different image on every recording medium. In the present invention, however, the image forming process solving these drawbacks at the same time is provided.

The paragraph starting at page 22, line 11 and ending at page 23 line 14 has been amended as follows.

More specifically, the surface layer 2 may be formed on the surface of the intermediate transfer medium 1 by a surface treatment such as processing with Teflon or application of silicone oil. Taking follow-up property to the recording medium into consideration, however, it is preferably composed of an elastic material. Preferable effects



are brought about by a rubber hardness (as measured by a rubber hardness meter in accordance with JIS K 6253) ranging from 10 to 100°. When the hardness is 40 to 80°, such a surface layer can cope with almost all recording paper sheets. More specifically, NBR, urethane rubber, chloroprene rubber and surface treated products thereof, and fluororubber, silicone rubber and ~~fluorosilicone~~ fluorosilicone rubber may be suitably used, ~~[[that]] as~~ as the materials themselves have ink-repelling property ~~may be suitably used~~. The surface form of the surface layer 2 is not limited. The form thereof may be selected taking the surface form of a recording medium used and the effect ~~[[of]]~~ on printing into consideration. For example, when an image such as an offset print is desired, a smooth surface form may preferably be selected for a smooth recording medium. On the contrary, when a form high in roughness or a surface such as a gravure cell is used for a ~~smooth~~ recording medium, an effect of printing according to ~~uses~~ the invention can also be achieved. In the following description, “the surface of the intermediate transfer medium” means “the surface of the surface layer on the intermediate transfer medium” unless expressly noted otherwise.

The paragraph starting at page 30, line 17 and ending at page 31, line 3 has been amended as follows.

In Step (c), an ink is ejected from an ink-jet recording head of the ink-jet recording apparatus 5 on the intermediate transfer medium, to which both a wettability-improving component and an image-fixing component have been applied, to form an ink image 6 on

the intermediate transfer medium. The reason why the ink-jet recording head is used as an image forming means in the present invention is that it is technically of non-contact recording in addition to the fact that it is a non-plate system. Even when the image-fixing component can be uniformly applied, it is difficult to apply the ink to the surface of the transfer medium high in releasability by any method of a contact system.

The paragraph starting at page 37, line 15 and ending at line 24 has been amended as follows.

As necessary, it is further effective to bring a dry Moulton roller into contact with the surface of the intermediate transfer medium or blow the surface after the cleaning, thereby drying the surface thereof. The cleaning is effectively conducted with the wettability-improving component according to the ink used. In such a case, the coating device 3 for applying the wettability-improving component as described above ~~functions~~ functions as a cleaning means.